

IN THE CLAIMS

11. (withdrawn) A swath band pass filter for use in a radar signal processing circuit, said filter comprising a first order filter, said filter configured to center on a doppler frequency and operate according to $E_o = (A_0/B_0) \times E_n - (A_0/B_0) \times E_n \times Z^{-2} - (B_1/B_0) \times E_o \times Z^{-1} - (B_2/B_0) \times E_o \times Z^{-2}$, where E_n is an input signal, A_0 is $2 \times F_s \times W_b$, B_0 is $(4 \times F_s^2) + (2 \times F_s \times W_b) + (W_l \times W_u)$, B_1 is $(2 \times W_l \times W_u) - (8 \times F_s^2)$, and $B_2 = (4 \times F_s^2) - (2 \times F_s \times W_b) + (W_l \times W_u)$, and $W_b = 2\pi B$, a bandwidth in radians, $W_u = 2\pi \times (F_c + B/2)$, an upper 3db point of said filter in radians, and $W_l = 2\pi \times (F_c - B/2)$, a lower 3db point of said filter in radians.

12. (currently amended) A radar signal processing circuit comprising:

a radar gate correlation circuit configured to sample radar data at a sampling rate;

a correlation ~~bass-pass~~ band pass filter configured to filter non-zero gated radar return samples and ~~ignore~~ not process a portion of zero amplitude gated radar return samples;

a mixer configured to down sample an in-phase component and a quadrature component of the filtered signal to a doppler frequency;

a band pass filter centered on the doppler frequency; and

a processor configured to determine a center frequency for said band pass filter, said processor configured to receive velocity vectors in body coordinates, an antenna mounting angle, and a slant range.

13. (original) A radar signal processing circuit according to Claim 12 wherein said band pass filter is configured to operate according to $E_o = (A_0/B_0) \times E_n - (A_0/B_0) \times E_n \times Z^{-2} - (B_1/B_0) \times E_o \times Z^{-1} - (B_2/B_0) \times E_o \times Z^{-2}$, where E_n is an input signal, A_0 is $2 \times F_s \times W_b$, B_0 is $(4 \times F_s^2) + (2 \times F_s \times W_b) + (W_l \times W_u)$, B_1 is $(2 \times W_l \times W_u) - (8 \times F_s^2)$, and $B_2 = (4 \times F_s^2) - (2 \times F_s \times W_b) + (W_l \times W_u)$, and $W_b = 2\pi B$, a bandwidth in radians, $W_u = 2\pi \times (F_c + B/2)$, an upper

3db point of said filter in radians, $Wl = 2\pi \times (Fc - B/2)$, a lower 3db point of said filter in radians, F_s is a sampling frequency and F_c is a determined center frequency for said band pass filter.

14. (currently amended) A radar signal processing circuit according to Claim 12 wherein said processor is configured to:

~~receive an antenna mounting angle, a slant range, and velocity vectors in body coordinates using the antenna mounting angle, slant range, and velocity vectors;~~

calculate a range swath doppler velocity, and a track and phase swath bandwidth;

calculate a phase swath doppler velocity based at least in part on the range swath doppler velocity and the track and phase swath bandwidth;

calculate a range swath center frequency based on the range swath doppler velocity;

calculate a phase swath center frequency based on the phase swath doppler velocity; and

calculate a level and verify swath bandwidth based upon the track and phase swath bandwidth.

15. (original) A radar signal processing circuit according to Claim 14 wherein said processor is configured to determine a doppler velocity, V_r at a range swath center frequency according to $V_r = V_v \times \cos(90-r-a) = V_v \times \sin(a+r)$, where $V_v = (V_x^2 + V_z^2)^{0.5}$, where V_x = velocity component on body x axis and V_z = velocity component on body z axis, $a = \arctan(V_z / V_x)$, and r is the antenna mounting angle.

16. (original) A radar signal processing circuit according to Claim 15 wherein said processor is configured to determine a range swath center frequency, F_r , according to $F_r = 2 \times V_r / L$, where L is a wavelength of the radar.

17. (original) A radar signal processing circuit according to Claim 14 wherein said processor is configured to calculate a phase swath doppler velocity, V_p , according to $V_p = V_v \times \cos(90-(r-p)-a) = V_v \times \sin(a + r - p)$, where $V_v = (V_x^2 + V_z^2)^{0.5}$, where V_x = velocity component on body x axis and V_z = velocity component on body z axis, $a = \arctan(V_z / V_x)$, r is the antenna mounting angle, and $p = (T \times V_x / H) \times (180 / \pi)$ in degrees, where $T = 1 / \pi B$ and is a delay through range swath filter, $T \times V_x$ is vehicle movement on body X axis, B is the swath bandwidth, and H is altitude in feet.

18. (original) A radar signal processing circuit according to Claim 17 wherein said processor is configured to determining a phase swath center frequency, F_p , according to $F_p = 2 \times V_p / L$, where L is a wavelength of the radar.

19. (original) A radar signal processing circuit according to Claim 14 wherein said processor is configured to calculate track and phase swath bandwidth, B , according to $B = V_x / (0.6(H)^{0.5})$ in hertz, where V_x = velocity component on body x axis and H is altitude in feet.

20. (original) A radar signal processing circuit according to Claim 19 wherein said processor is configured to calculate level and verify swath bandwidth as a ratio of level and verify bandwidths to track and phase bandwidths, K , multiplied by track and phase swath bandwidth, B .

21. (withdrawn) A method for centering a doppler swath within an antenna beam utilizing a radar signal processing circuit including a processor, said method comprising:

controlling a swath filter center frequency with the processor based on aircraft velocity;
and

controlling swath filter bandwidth with the processor based on aircraft velocity such that a charge time for the filter is equal to the time that the aircraft takes to fly across the doppler swath.

22. (withdrawn) A method according to Claim 21 wherein an antenna mounting angle, a pitch of the aircraft, and an angle to a center of the antenna beam are known, and the swath filter center frequency, F_c , is calculated with the processor according to $F_c = 2 \times \text{Velocity} \times \sin(\text{angle}) / \text{radar wavelength}$.

23. (withdrawn) A method according to Claim 22 wherein controlling swath filter bandwidth comprises setting a bandwidth, B , with the processor according to $B = \text{Velocity} / (0.6(H)^{0.5})$ in hertz, where H is altitude in feet.